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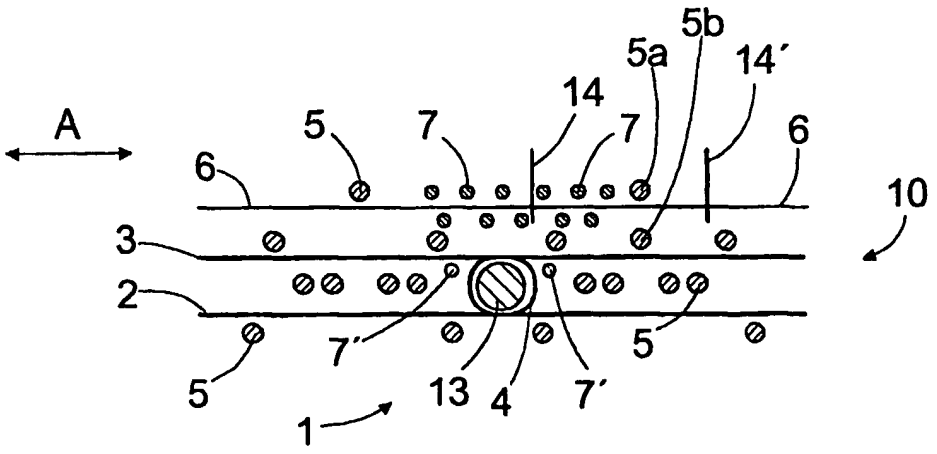
Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH,*

[Continued on next page]

(54) Title: PRESS FELT AND BASE FABRIC



(57) Abstract: The invention relates to a press felt and a base fabric. The base fabric (10) includes seam loops (4) for joining the transverse joining edges of the press felt to each other. In addition to the longitudinal yarns (2, 3) that form seam loops, the base fabric includes longitudinal surface yarns (6) extending over a seam (1) on the web-side surface (D). At the seam, there are additional transverse yarns (7), which are attached at least to the longitudinal surface yarns so as to form a seam flap (8). The longitudinal surface yarns (6) are cut after batt fibre has been attached.

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PRESS FELT AND BASE FABRIC

FIELD OF THE INVENTION

[0001] The invention relates to a press felt comprising: at least one base fabric, which includes a bottom side and a side facing the web to be dried and several longitudinal yarns and transverse yarns and where at least some of the longitudinal yarns are arranged to form several seam loops at a first transverse joining edge of the press felt and at a second transverse joining edge, the joining edges of the base fabric being arrangeable edge on edge to form a seam, where the seam loops of the first joining edge and the second joining edge intermesh and form a seam loop channel, into which a seam yarn connecting the joining edges can be inserted; a seam flap, which is arranged to cover the seam on the press felt surface facing the web, and at least one batt fibre layer arranged at least on the base fabric surface facing the web.

[0002] The invention further relates to a base fabric intended for a press felt, the base fabric consisting of a base side and a web side and comprising: several longitudinal yarns arranged to form seam loops at a first and a second transverse edge of the base fabric; and several transverse yarns arranged to attach to the longitudinal yarns.

BACKGROUND OF THE INVENTION

[0003] Depending on the press structure, the press section of the paper machine employs a press felt on one or both sides of the web to be dried, into which the water in the web is absorbed in the pressing phase. The purpose is to transport the water away in the structure of the press felt without letting it back into the web. The press felt comprises a base fabric which, for example, provides the felt with a necessary space for water. To obtain a smooth surface, batt fibre is needled at least onto a base fabric surface facing the paper web, the batt fibre preventing markings from being produced on the web. Also, the water retention capacity of the felt can be adjusted by means of the batt fibre. To facilitate the installation of press felts, it is known to provide them with seams. The transverse edges of such felts comprise seam loops. It is not until in the paper machine that the felt is connected into a closed loop by intermeshing the seam loops on the opposite edges and inserting a seam yarn into a seam loop channel thus formed. A problem associated with felts provided with seams is that the seam loops form a discontinuity in the felt base fabric where the felt thickness is different, which causes markings on the web.

Furthermore, in the seam area, the yarn density differs from that in the rest of the structure, in which case the felt permeability is different at the seam. The difference in permeability may also cause markings on the web. In addition, since the number of yarns is lower in the seam area, adherence of the batt fibre may also pose a problem.

BRIEF DESCRIPTION OF THE INVENTION

[0004] The object of the invention is to provide a novel and improved press felt and base fabric for a press felt.

[0005] The press felt according to the invention is characterized in that the base fabric has at least a three-layer structure which comprises, in addition to the longitudinal yarns forming seam loops, at least one layer of longitudinal surface yarns on the web-side surface of the base fabric, the yarns being arranged to attach to at least some of the transverse yarns, that the longitudinal surface yarns are arranged to continuously extend over the seam when the base fabric is manufactured, that several additional transverse yarns are provided at the seam, the yarns being attached at least to the longitudinal surface yarns, and that the longitudinal surface yarns have been cut after the attachment of batt fibre to form a seam flap.

[0006] The base fabric according to the invention is characterized in that in addition to the longitudinal yarns forming seam loops, there is at least one layer of longitudinal surface yarns on the web-side surface of the base fabric, that the longitudinal surface yarns are attached to at least some of the transverse yarns, that the longitudinal surface yarns extend continuously over a seam formed by seam loops on the first and the second edge, and that the area where the seam is to be formed is provided with several additional transverse yarns, which are attached at least to the longitudinal surface yarns.

[0007] The invention is based on the idea that the web-side surface of the base fabric is provided with at least one layer of longitudinal yarns, which are attached to the transverse yarns of the base fabric and further arranged to extend over the seam when the base fabric is manufactured. Furthermore, additional transverse yarns excessive to the rest of the structure are brought to the seam area during manufacture. These yarns join at least the surface yarns that travel over the seam. After the base fabric has been formed, one or more batt fibre layers are attached at least to its web-side surface. It is

not until after this that the longitudinal surface yarns travelling over the seam are cut, whereby a seam flap which protects the seam is formed.

[0008] An advantage of the invention is that the seam flap protects the seam from mechanical wear. Furthermore, since the seam flap comprises both longitudinal and transverse yarns, its structure is durable and firm. The number and quality of longitudinal surface yarns as well as those of the additional transverse yarns can be easily varied to obtain a desirable base fabric without having to substantially alter the structure of the basic weave. A further advantage is that batt fibre can be attached well to the seam area since the seam flap comprises both transverse and longitudinal yarns. Thus the permeability and thickness may be substantially the same at the seam as in the other press felt sections.

[0009] In respect of weaving technique, the length of the seam flap can be implemented such that stretching of the seam loops during use is compensated for and the seam flap always provides sufficient protection for the seam.

[0010] An embodiment of the invention is based on the idea that the longitudinal yarns to be extended over the seam on the base fabric surface differ from the monofilaments that form seam loops in the base fabric. For example, plied yarns can be used as longitudinal surface yarns. Thanks to the structure according to the invention, the longitudinal surface yarns can be selected so as to obtain a good surface smoothness and batt fibre adherence.

[0011] An embodiment of the invention is based on the idea that the additional transverse yarns in the seam flap are attached to the longitudinal surface yarns by weaving.

[0012] An embodiment of the invention is based on the idea that the additional longitudinal yarns and longitudinal surface yarns are attached to one another by weaving, and after weaving, the attachment of the yarns is secured by melting or welding the yarns into one another. The result is a very firm and durable seam flap.

[0013] An embodiment of the invention is based on the idea that the additional transverse yarns attach only to the longitudinal yarns that travel over the seam.

[0014] The basic idea of an embodiment according to the invention is that the longitudinal yarns in the base fabric do not cross one another. Thus the longitudinal surface yarns form a layer which is independent of the rest of

the structure and whose yarns can be selected relatively freely. In addition, since the longitudinal surface yarns do not cross the yarns forming seam loops, they do not take room between adjacent seam loops. The longitudinal surface yarns have no effect on the density of the seam loops, and thus the loop density can be selected according to the need.

[0015] An embodiment of the invention is based on the idea that the seam flap area is provided with a special reinforced layer, such as a layer made of resin or adhesive which reinforces the structure of the seam flap.

BRIEF DESCRIPTION OF FIGURES

[0016] The invention will be described in greater detail in the accompanying drawings, in which

Figure 1 is a schematic perspective view of a press felt according to the invention which is provided with a seam and connected into a closed loop,

Figure 2 schematically illustrates the structure of an edge of a press felt according to the invention seen in the direction of transverse yarns,

Figure 3 schematically illustrates the structure of a base fabric according to the invention seen in the direction of transverse yarns, and

Figure 4 schematically illustrates a method of manufacturing a base fabric according to the invention.

[0017] For the sake of clarity, the figures illustrate the invention in a simplified manner. Like reference numbers refer to like parts in the figures.

DETAILED DESCRIPTION OF THE INVENTION

[0018] It appears from Figure 1 how the press felt can be formed into a closed loop by connecting the joining edges at its transverse edges together by a seam 1. The press felt may also consist of several press felt pieces joined together, in which case there are naturally several seams. The press felt is run on the paper machine in the machine direction A marked in the figure. In addition, in the transverse direction B, the width of the press felt corresponds to that of the paper machine.

[0019] Figure 2 illustrates a transverse B joining edge of a press felt according to the invention. For the sake of clarity, the figure illustrates only a few of the transverse yarns. The base fabric of the press felt shown in the figure has been manufactured by weaving longitudinal yarns and transverse yarns together using a suitable weave. The structure comprises at least three layers, i.e. it contains three superimposed longitudinal yarns. The longitudinal

yarn 2 on the bottom side C of the press felt and the longitudinal yarn 3 in the middle form a seam loop 4 at the joining edge. Usually, all yarns 2 and 3 at the bottom and in the middle form seam loops but in some cases some of the longitudinal yarns may not form seam loops. The longitudinal yarns 2 and 3 at the bottom and in the middle bind to transverse yarns 5. In addition, on the web-side surface D, there is a longitudinal surface yarn 6, which also binds to the transverse yarns 5 in the weave. The longitudinal surface yarn 6 clearly extends further than the seam loops in direction A in the embodiment shown in Figure 2. In some cases, the longitudinal surface yarns 6 may be cut approximately at the seam loops. In addition, the seam 1 area is provided with a sufficient number of additional transverse yarns 7, which attach to the longitudinal surface yarns 6. The materials, cross sections and yarn types of the additional yarns 7 and longitudinal surface yarns 6 can be selected independently of the rest of the base fabric structure. The longitudinal yarns 2 and 3 that form seam loops 4 are typically made of monofilaments but the longitudinal surface yarns 6 as well as the additional yarns 7 may also be made of plied fibre, for example. Batt fibre is much easier to attach to yarns made of plied fibre and to a weave structure formed from them. The longitudinal surface yarns 6 and additional yarns 7 form together a seam flap 8, which protects the seam 1. The seam flap 8 is a press felt part which has substantially the same width as the press felt and whose one transverse edge is attached to the rest of the press felt structure when the other transverse edge is free. In addition, on the web-side surface D of the press felt, there is at least one layer of batt fibre 11. Usually, the batt fibre is attached to the base fabric 10 by needling. There may also be batt fibre on the bottom-side surface C. Furthermore, the seam flap 8 may be provided with one or more reinforcing layers 12, which makes the seam flap firm and affects its permeability. The reinforcing layer 12 may be a perforated film, a resin layer, an adhesive layer or another material layer applied by spreading, spraying, injecting or by means of a roller, for example. On the other hand, after weaving, the base fabric may be treated with an ultrasonic device or heated at least in the seam area, in which case the longitudinal surface yarns 6 and additional yarns 7 join one another. A suitable material can be selected for the yarns 6 and 7 by taking the treatment in question into account. Thus the yarns 6 and 7 may be 'fusible yarns', for instance.

[0020] Figure 3 illustrates part of a base fabric 10 according to the invention. To illustrate the seam 1 structure, a seam yarn 13, which connects

the joining edges together, has been inserted into the seam loop channel formed by the seam loops 4. The longitudinal surface yarns 6 are arranged to extend over the seam 1. A point where the longitudinal surface yarns 6 can be cut e.g. in the transverse direction to form a seam flap is marked in the figure with reference number 14. The cutting is performed after the necessary batt fibre layers have been attached to the base fabric 10. This is advantageous since batt fibre makes the structure stable, in which case there is no risk that the longitudinal surface yarns 6 will slip inside the weave basic structure after cutting and thus shorten the length of the seam flap to be formed. It further appears from Figure 3 that there may be additional transverse yarns at the seam loops 4 as well as at a section before the base fabric section. Thus the discontinuity caused in the weave structure by the seam loops 4 can be sealed and supported with additional yarns 7.

[0021] Figure 3 further illustrates an alternative cutting point 14', which is clearly outside the seam area 1. In that case, a relatively long seam flap 8 is formed in the base fabric. This flap compensates for the discontinuity caused by the seam 1 over a longer section. The free edge of the seam flap can be, if necessary, attached after insertion of the seam yarn by needling, stitching, melting, using an adhesive or with suitable form-locking members. When the cutting point 14' is used, the transverse yarn is in position 5b instead of position 5a.

[0022] As further appears from Figure 3, at least some of the additional transverse yarns 7' may also bind to the yarns 2 and 3 that form seam loops 4.

[0023] Figure 4 illustrates a method of manufacturing a base fabric 10, where the fabric is manufactured in one step in one weaving machine. For the sake of clarity, only a few of transverse yarns are shown. The section of the fabric that forms seam loops 4 is woven into an endless structure using 'horseshoe weaving'. In the figure, seam loops are formed on the upper and the lower level at the right-hand edge of the fabric. The figure also shows an edge yarn 15, round which the seam loops 4 are woven. An upper structure is simultaneously woven into a closed loop on top of the structure forming seam loops 4. This structure comprises longitudinal surface yarns 6 that extend over the seam and additional yarns 7. After weaving, the base fabric 10 is transferred into a needling machine, where batt fibre is attached. Then the press felt can be subjected to a thermal treatment and other necessary post-treatments.

Finally, before installation in a paper machine, the longitudinal surface yarns 6 are cut and the seam is opened.

[0024] It further appears from Figure 4 that the longitudinal surface yarns 6 can be woven into a loop with a desired length around the structure forming seam loops 4. A suitable filling material can be used as an aid in weaving, such as auxiliary yarns 16, by means of which the longitudinal surface yarns 6 can be guided in a weaving machine. This way, it is possible to form a seam flap 8' with a desired length independent of the rest of the base fabric 10 structure. This seam flap is illustrated in the figure with a broken line

[0025] It should be noted that the base fabric 10 can be formed using weave patterns other than those illustrated in the figures. In addition, the longitudinal surface yarns 6 can be arranged in two or more layers and they form a seam flap 8 with the additional yarns 7.

[0026] It should further be mentioned that instead of the woven structures described above, the base fabric may be a yarn assembly.

[0027] The drawings and the related description are only intended to illustrate the inventive concept. The details of the invention may vary within the scope of the claims.

CLAIMS

1. A press felt comprising:

at least one base fabric (10), which includes a bottom side (C) and a side (D) facing the web to be dried and several longitudinal yarns (2, 3) and transverse yarns (5) and where at least some of the longitudinal yarns (2, 3) are arranged to form several seam loops (4) at a first transverse joining edge of the press felt and at a second transverse joining edge, the joining edges of the base fabric (10) being arrangeable edge on edge to form a seam (1), where the seam loops (4) of the first joining edge and the second joining edge intermesh and form a seam loop channel, into which a seam yarn (13) connecting the joining edges can be inserted;

a seam flap (8), which is arranged to cover the seam (1) on the press felt surface (D) facing the web, and

at least one batt fibre layer (11) arranged at least on the base fabric (10) surface (D) facing the web, **characterized** in that

the base fabric (10) has at least a three-layer structure which comprises, in addition to the longitudinal yarns (2, 3) forming seam loops (4), at least one layer of longitudinal surface yarns (6) on the web-side surface (D) of the base fabric (10), the yarns being arranged to attach to at least some of the transverse yarns (5),

the longitudinal surface yarns (6) are arranged to continuously extend over the seam (1) when the base fabric (10) is manufactured,

several additional transverse yarns (7) are provided at the seam (1), the yarns being attached at least to the longitudinal surface yarns (6), and

the longitudinal surface yarns (6) have been cut after the attachment of batt fibre to form a seam flap (8).

2. A press felt according to claim 1, **characterized** in that the base fabric (10) is a woven structure formed in one phase in one weaving machine.

3. A press felt according to claim 1 or 2, **characterized** in that the structure of the seam flap (8) is reinforced by providing it with at least one additional reinforcing material layer (12).

4. A press felt according to claim 1 or 2, **characterized** in that the structure of the seam flap (8) is reinforced by attaching the longitudinal

surface yarns (6) to the transverse additional yarns (7) by an adhesive and/or by melting their materials.

5. A press felt according to any one of the preceding claims, **characterized** in that at least some of the longitudinal surface yarns (6) are made of plied yarn and that the longitudinal yarns (2, 3) forming seam loops (4) are monofilaments.

6. A base fabric intended for a press felt, the base fabric (10) comprising a bottom side (C) and a web side (D) and further:

several longitudinal yarns (2, 3), which are arranged to form seam loops (4) on a first and a second transverse edge of the base fabric (10); and

several transverse yarns (5), which are arranged to attach to the longitudinal yarns (2, 3), **characterized** in that

in addition to the longitudinal yarns (2, 3) that form seam loops (4), there is at least one layer of longitudinal surface yarns (6) on the web side (D) of the base fabric (10),

the longitudinal surface yarns (6) are attached to at least some of the transverse yarns (5),

the longitudinal surface yarns (6) extend continuously over the seam (1) formed by the seam loops (4) on the first and the second edge, and

the area where the seam (1) is to be formed is provided with several additional transverse yarns (7), which are attached at least to the longitudinal surface yarns (6).

7. A base fabric according to claim 6, **characterized** in that each longitudinal yarn (2, 3, 6) is arranged to run in the base fabric so that it does not cross the other longitudinal yarns.

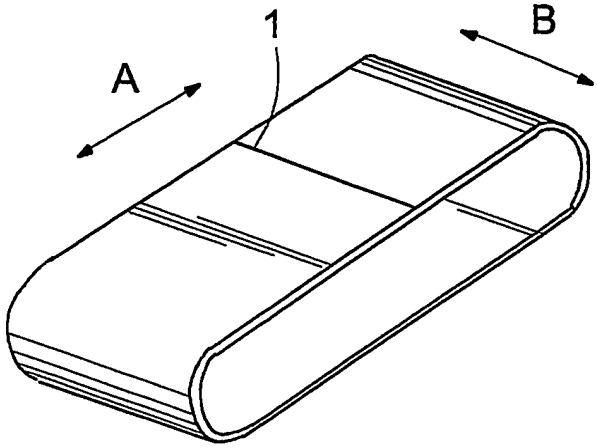

FIG. 1

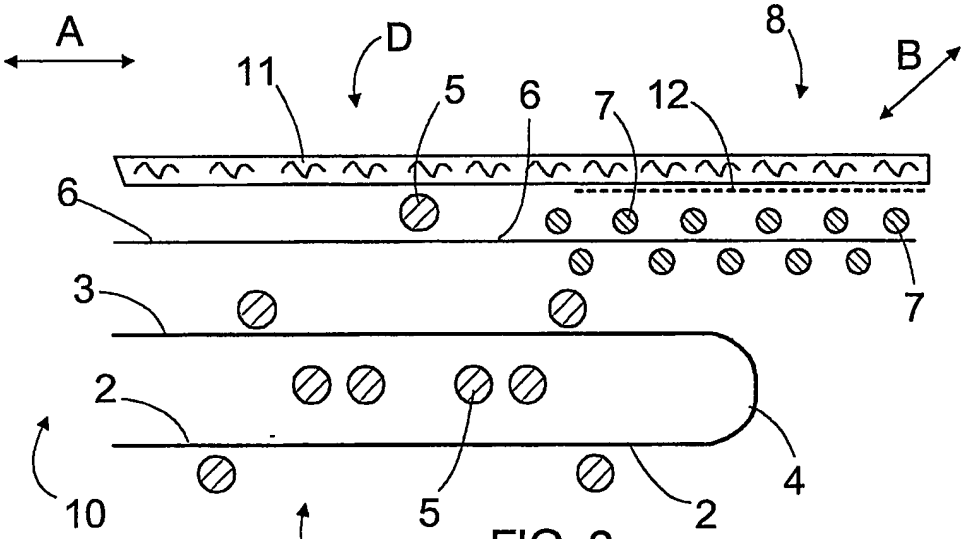

FIG. 2

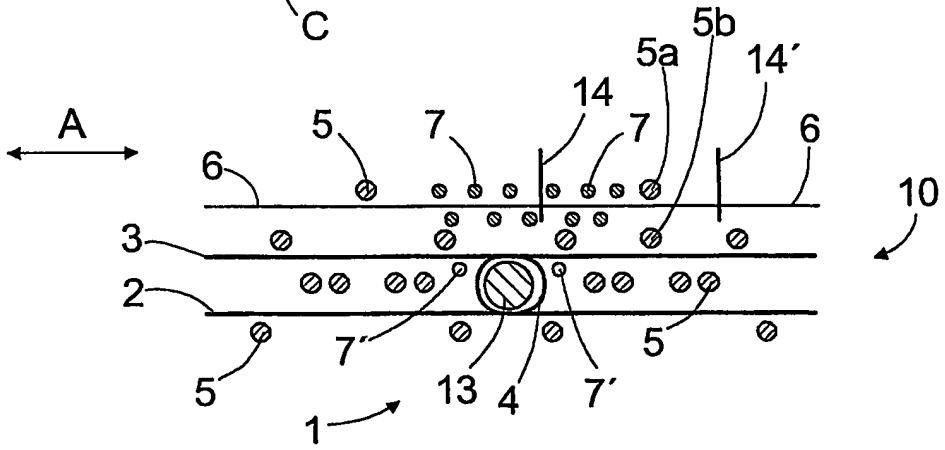

FIG. 3

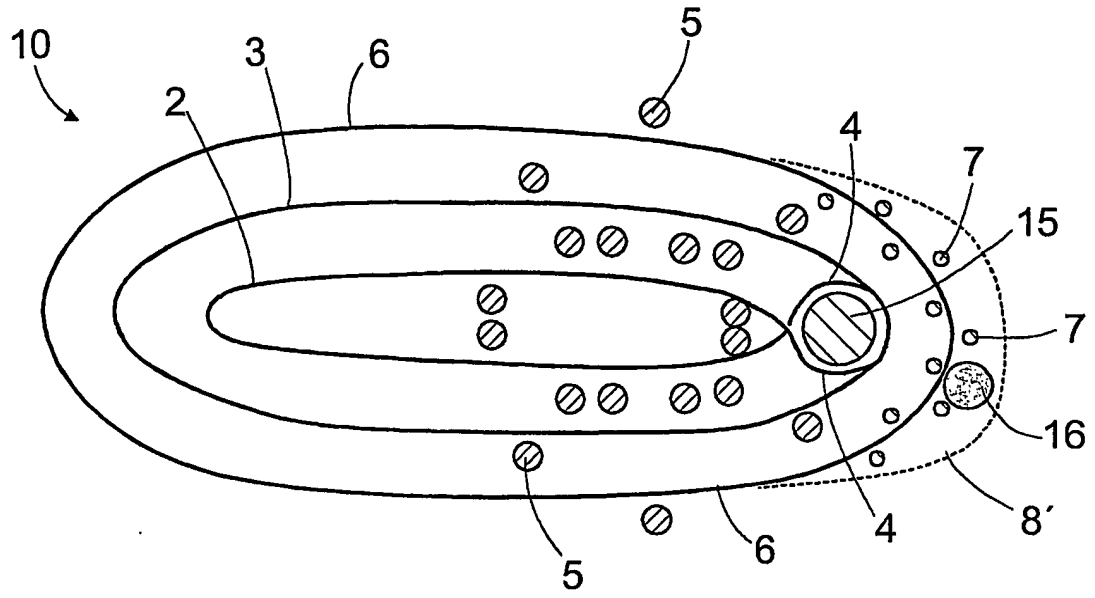

FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 03/00698

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: D21F 7/10
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: D21F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 02053834 A1 (TAMFELT OYJ ABP), 11 July 2002 (11.07.02) -- --------	1,6

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
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"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
15 December 2003	29 -12- 2003
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INTERNATIONAL SEARCH REPORT

Information on patent family members

31/10/03

International application No.
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 02053834 A1	11/07/02	CA 2429669 A	11/07/02
		EP 1352127 A	15/10/03
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